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EVALUATION OF WORD ATTACK SKILLS

Joseph F. Follettie

ABSTRACT

A framework for more apt and sensitive evaluation of generalized word attack skill--the heart of oral reading skill--is presented. The paper envisions the design and development of oral reading instruction as bounded by a fully-specified evaluation scheme.

EVALUATION OF WORD ATTACK SKILLS

Phonics-based word attack instruction seeks to promote generalization from given program contents to words not previously employed in the instruction. The object of phonics-based instruction is to secure generalized word attack skill in consequence of articulation responses to letter-sound rules and blending and pronunciation responses to exemplary words and word elements. Most would agree that the likely power of word attack instruction warranting description as phonics-based is appreciably greater than that of comparable instruction emphasizing the rote mastery of program words. That is because generalized word attack skill inherent in a phonics-based treatment ostensibly permits transformation of much of the speech vocabulary into sight vocabulary in absence of intervening word-by-word sight word instruction.

The utility of phonics-based instruction turns on how well it promotes generalized word attack skill. Its ostensible power advantage notwithstanding, if phonics-based instruction fails to promote generalization or does so at prohibitive cost, then sight word instruction emphasizing rote mastery of program words may prove a better educational investment. Worth considering also is the proposition that phonics-based instruction will be most apt for some children, while sight word instruction will be most apt for others.

Let us agree that its ostensible power advantage justifies our exposing the child to phonics-based word attack instruction during early oral reading and for as long thereafter as effects of such

instruction warrant. Were there no other compelling reasons for evaluating generalized word attack skill, we would have to conclude that present evaluation schemes are less apt, less sensitive, and less used than confident decision making requires. Unfortunately, there are other compelling reasons for requiring more apt and sensitive means for evaluating generalized word attack skill. Decisions of two classes turn on an appreciably-improved evaluation capability. One class of decisions references to curriculum characteristics. E.g., How well does a given member of a range of alternative word attack instructional treatments promote sight vocabulary acquisition? Decisions of the second class relate to individualization of instruction. E.g., a) When is a child qualified to advance to following word attack instruction? b) When can one say with assurance that a child will find the less theoretically-powerful sight word approach to word attack instruction more conducive to sight vocabulary acquisition than phonics-based instruction?

Few innovations will take hold in the classroom before the innovation of apt, sensitive, extensive evaluation has been accomplished. The educational innovator will continue to wander in the wilderness--and properly so--until he has solved the evaluation problem well enough to be able to demonstrate utility of other innovative programs in unequivocal terms. This paper lays the framework for more apt and sensitive evaluation of generalized word attack skill, which is the cornerstone of efficient decoding-to-speech operations.

Below is developed an explicit, systematic basis for evaluating both rote and generalization facets of word attack skill. A system

of levels of one-syllable blends is presented, orders of generalizacion across blend levels is defined, and a battery of word attack proficiency tes' onsonant with blend levels and orders of generalization is described.

Illustrative Content

To achieve concrete exposition referencing to an appreciable word attack content, we will employ a segment of current SWRL specifications for phonics-based reading instruction. That part of the design of interest here is a 10-unit introductory program featuring 7 vowel and 22 consonant letter-sound rules, 21 terminally-defined program sight words, and 80 terminally-defined program rule words. The 29 rules and associated rule word exemplars are the raw materials on which one defines segmentation-blending instruction addressing generalized word attack skill. The evaluation program to be illustrated will stem from these raw materials.[1]

Blend Levels

Blend levels and orders of generalization are specified in Appendix A. Blend levels are defined on one-syllable constructions. For the most part, blend level is one less than the number of phonemes in the

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[1] This paper employs only such experimental program information as is contained on page 4 of SWRL DM13 (Sullivan, et al, 1969). The experimental program is used only to define a rule base, program words, and rule sequencing to which the illustrative evaluation program will reference. Some other rule base, program words, and rule sequencing might do as well. Extension of the content-generation work described in Appendix B should provide its own basis for rule specification and sequencing and for word attack exemplary word specification.

one-syllable construction. Thus, a letter-sound rule is a zeroth-level blend, a two-phoneme construction--e.g., VC, CV--is a first-level blend, a three-phoneme construction--e.g., CVC, VCC--is a second-level blend, etc. (But see Footnote 2.)

The order of a generalization test item must be defined on an explicit view concerning how segmentation-blending instruction occurs across blend levels. A different view than is presented here will yield a different framework for defining orders of generalization. The view to be presented is a heuristic that invites either rational or empirical attack; it asks only that adherents of opposing views be oriented to the word attack problem as a whole. Summarized below, the view is presented in greater detail in Appendix A.

1. Letter-sound rules are learned in consequence of paired-associates training. The set of rules learned at any point in time consists of consonant and vowel subsets. A learned consonant rule is denoted C (or C_i); a learned vowel rule V (or V_i). C and V elements are the lowest-level raw materials of blending instruction. We denote them zeroth-level blends to place them on the continuum of blends while indicating that they do not involve blending.

1.1 Almost without exception, C and V sounds are single phonemes.[2] Their letter associates may be a single grapheme (the usual case in the illustrative word

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[2] Rule X10 is an exception. This one-grapheme rule reflects a sound of two-phoneme length. Rule notation is that of SWRL TR15 (Berdiansky, et al, 1969).

attack curriculum) or a pair of graphemes--e.g., CK10, SH10, TH11, TH13.

1.2 Certain consonants in terminal position in the syllable may be expressed as single or geminate graphemes--e.g., L10 = -L or -LL, S10 = -S or -SS.

1.3 For present purposes, any PA training requirements underlying getting the child to react to a two-letter pair--e.g., CK--as a unit or to learn a single-geminate grapheme equivalence--e.g., L10 = -L or -LL--will be ignored. Although such training requirements may exist, they are no part of development of apt responses across blend levels, which are defined on phonemic rather than graphemic units.

2. Earliest blending instruction combines V and C elements to yield first-level blends. V+C yields VC; C+V yields CV. The VC blend is employed almost exclusively in the higher-order blending instruction referencing to one-syllable constructions. The CV blend is introduced into early instruction to obtain a few useful CV words--e.g., BE, SEE. The only non-short vowels employed in illustrative early word attack instruction are those occurring in such words. (A long vowel EE10 also is slightly used in CVC blends.)

3. Second-level blends usually are built on VC blends. C+VC yields CVC; VC+C yields VCC. (C+CV yields CCV--e.g., TREE, THREE. This type of second-level blend is of limited productivity and will not be considered further.)

4. Third-level blends are built on second-level blends.[3] C+CVC yields CCVC; C+VCC yields CVCC. (For present purposes, we will assume that CVC+C is less efficient than C+VCC as a basis for obtaining CVCC. The question is open to empirical evaluation. It is not unusual to build CCVC using C_VC as the shared element, e.g., of SCAN, SPAN, STAN. This matter is discussed more fully in Appendix A.)

5. Fourth-level blends--which are rather infrequent in the lexicon and infrequently reached in early reading instruction--are built on third-level blends. C+CVCC yields CCVCC--e.g., BRISK; C+CCVC yields CCCVC--e.g., STRAP; CVCC+C yields CVCCC--e.g., BURST. While fourth-level blends will not be considered in the testing program to be sketched, both fourth-level and fifth-level blends are inventoried in Appendix B.

Orders of Generalization

Proposition 9 of Appendix A and supporting comments indicate effects on the generalization item universe (and on training) of assuming that the child will generalize from apt exemplars to novel items along both vowel and consonant dimensions of the VC blend. Proposition 10 and supporting comments indicate effects of assuming that generalization occurs only along the consonant dimension. Which assumption is more reasonable--or the conditions under which either assumption is reasonable--

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[3] One might view the CCVC blend as arising from a blending of the first-level blends CC and VC--e.g., SK+IP yields SKIP. This possibility is discussed in Appendix A. Such a view of the course of blending instruction would entail differently-defined orders of generalization than are used here.

is an empirical matter awaiting scrutiny. For present purposes, we assume that generalization occurs only along consonant dimensions. The effect of this assumption is to reference the generalization test more narrowly to training than would be the case if the alternative assumption were made.

Orders of generalization are defined as follows:

1. When learning or performance is a specific consequence of paired-associates training, then 0th-order generalization--that is, no generalization at all--characterizes the item learned. When the item so learned is tested using that item, then the test is for rote learning or for 0th-order generalization. This convention places such tests on the generalization continuum while indicating that generalization is not involved. 0th-order generalization tests may occur for program sight words (SW), program rules (C, V), and for exemplary blends employed at all levels of blending--e.g., program word attack words at first-level (VC, CV), second-level (CVC, VCC), or third-level (CCVC, CVCC).

2. All generalization tests contemplate generalizing from a PA-trained nth-level blend (including zeroth-level) to an (nth+1)-level blend. Generalization is referenced to the set of learned consonant rules insofar as members of the set apply and requires exemplarization of the (nth+1)-level blend as the precondition. While it is not a requirement of the view developed in Appendix A that more than one exemplar occur at the (nth+1)-level for any vowel-defined blend to be generalized, the illustrative test battery will

be premised on two PA-trained exemplars when the (nth+1)-level is second-level or third-level. Thus, while the learned rule set (B, D, L, M, N, P, S, T), the learned VC blend AD, and the single learned CVC blend BAD are considered sufficient to forming the 1st-order generalizations DAD, LAD, etc. in light of thinking presented in Appendix A, the illustrative generalization item universes will assume that word attack exemplarization training uses up two items--e.g., BAD, NAD.

3. A 2nd-order generalization is formed on a 1st-order generalization. Thus, if the set of learned rules includes (B, D, P), the VC blend AD is PA-trained, and the CVC blend PAD is PA-trained, then the VC blend AB is an item testing for 1st-order generalization. Under these conditions, such items as BAB, DAB, and PAB test for 2nd-order generalization. (While higher-order generalizations can be defined, it will be assumed that one would not wish to levy generalization test requirements that go beyond 2nd-order in consequence of early word attack instruction.[4])

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[4]Some might contend that many children are not capable even of 1st-order generalization during introductory word attack instruction. This is reminiscent of reading readiness arguments and other ploys designed to place the blame for ineffective instruction on the child rather than those who design and deliver the instruction. While one must determine empirically whether conditions exist under which 1st-order generalization can be obtained from all general-category children and, if so, whether the cost-return picture is satisfactory, the question cannot even be framed adequately in absence of a scheme for defining orders of generalization. Appendix B sketches an extensive word attack content that might be used to evaluate with assurance whether there are children who would profit to a greater extent from word attack instruction based on a sight word approach than from instruction based on a phonics approach. The potential power of phonics-based instruction is such that one would want to have any decision to not use such instruction firmly based on apt evaluation data. That alone should be a sufficient basis for motivating development of an apt evaluation program.

Content Organization and Testing

When one learns that in 1493 Columbus sailed the deep blue sea--or something approximately like that--it can thereafter be set aside for long periods of time, or even forever. Such information then is subject to "rust with disuse," or "forgetting." The content of phonics-based word attack instruction is of a different sort. Such content (and that of much other instruction aimed at providing the child with tool skills of education) expands over instructional time in such a way that earlier content treatments are integral parts of later content treatments. This is beneficial to the evaluation program because it can then in some sense circumvent the vexing problem concerning what to do about decline with disuse. If the instructional design is apt, there will be no disuse in the usual sense. However, it is apparent that expansion of a content under conditions of fixed exposure duration per day must lead to dilution or diminution of practice per unit content. Hence, it is entertainable that earlier proficiencies will decline as content expands, even when rote learning requirements are minimized through use of a rule-set basis for effecting accurate pronunciation responses.

When dealing with an aptly-designed expanding content, the evaluator has two options. One is to assume that things learned stay learned in consequence of continuing practice. The result would be to restrict evaluation to new content elements, which would be economical with regard to testing time. The other option is to expand the evaluation domain as the content domain expands, which might prove

more costly in testing time but might be cheaper when viewed in terms of the return on the overall educational investment. Perhaps the savings in testing time accruing to selecting the first option is more apparent than real. For example, if the evaluator knows that he is going to get another crack at evaluating the child for word attack skills referencing to given content elements at a later point in the instructional sequence, he might settle for more relaxed criterion levels of performance underlying advancing the child to following instructing than he would otherwise, thus perhaps effecting saving both in instructional and testing time.

The illustrative instructional content has been divided into two portions: a) Units 1-5 and b) Units 6-10, where the Units 1-5 portion is incorporated into the Units 6-10 portion both for instructional and evaluative purposes. For present purposes then we accept the second of the options discussed above. Evaluation is viewed as occurring on completion of Units 5 and 10, with decisions to advance or recycle the child to be based on whether criterion performance is achieved at these points in negotiation of the instruction.[5]

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[5] The Units 1-5, 6-10 breakdown is arbitrary in that it does not consider how frequently the child should be tested. Assuming that a decision to advance or recycle should occur more than once during negotiation of Units 1-10, the breakdown permits us to obtain some feeling for the problem of defining a series of tests to be applied at different points in content elaboration.

Test Materials

Table 1 reflects the 0th-, 1st-, and 2nd-order generalization tests that will apply following negotiation of Units 1-10 instruction. Number of items for "first tests" are determined from tables to be described. Test 0.0 references to progr[illegible]ords used in stories. Other tests whose initial digit is 0 reference to rules and blends, inherent in program rule words used in stories, that are PA-trained during word attack instruction. Some of these items are program rule words used in stories and some are rule words used in word attack instruction as members of contrasting pairs of blends on which program rule words are built. Tests whose initial digit is 1 or 2 are tests for 1st- and 2nd-order generalization, respectively.

Table 2 presents the 0th-order generalization test items for Units 1-5 content; Table 3, those for 1st- and 2nd-order generalization tests. Not all tests employed following negotiation of Unit 10 are appropriate following negotiation of Unit 5. The Post-Unit 5 test battery is a subset of the Post-Unit 10 test battery.[6] In Table 3, the first row for a generalization test yields "first test" items. Remaining rows show what is left in the universe should second and later tests using novel items be needed.

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[6] Ideally, Post-Unit 5 and Post-Unit 10 test batteries would be devised in unison, or in such a way as to insure incorporation at least of "first test" items of the first battery into the pool of word attack words so that these now nonnovel words would not thereafter be used in 1st- and 2nd-order generalization tests. This matter is poorly handled in Tables 2-5.

Table 1.

Post-Unit 10 Test Battery: Articulation & Pronunciation Accuracy[a]

Word or Element	0th-Order (Rote Learning) Tests	Max Items	Min Items	1st-Order Generalization Tests	Items	2nd-Order Generalization Tests	Items
SW	0.0	21					
C	0.11	22					
V	0.12	7					
VC	0.21	42		1.21	16		
CV	0.22	7					
CVC	0.31	75	37	1.31	36	2.31	16
VCC	0.32	13		1.32	5		
CCV		2	1				
CCVC	0.41	22	11	1.41	11	2.41	38
	0.42	18	9	1.42	8	2.42	5

[a]Tests 2.31, 2.41, and 2.42 are defined on Tests 1.21, 1.31, and 1.32 respectively, where Tests 1.31 and 1.32 are defined on Tests 0.21 and 0.22 respectively. Through oversight, materials for Test 1.31 (Table 5) failed to reflect a few of the usable VC endings of Test 0.21.

Table 2.

Units 1-5: Program and Supplemental Word Attack Words and Word Elements[a]

Oth-Order Test	Number of Items	Items
0.0	17	A ARE GO I IS LOG ME ON PLAY MET THE THERE TO WE WILL WITH YOU
0.11	8	B10 D10 L10 M10 N10 P10 S10 T10
0.12	4	A15 E15 I15 U15
0.21	16	AM ANN ap at en et id ill IN ip IT ub ud UP US ut
0.31	20	NAT-PAT DEN-men LET-bet DID-lid LIL-Bill TIP-nip PIT-SIT TUB-sub BUD-MUD TUT-nut
0.32	1	AND
0.41	3	SNAP STILL SLIP
0.42	4	BAND LAND TENT MUST

[a] Upper case items are program words. Lower case items are supplementary word attack words or elements of program words referencing to higher-order generalization tests.

Table 3.

Post-Unit 5 Testing: Item Universes for 1st- and 2nd-Order Generalization Tests

Universe	Number of Items	Items
1.21	10	ab ad ed ell em es ib im um un
1.31	10	sat Ben met Sid pill dip bit dub sud mutt
	10	bat ten pet mid sill lip lit nub dud Sut
	9	mat pen net bid mill sip nit Bub but
	8	tat Len set till pip mitt pub putt
	1	dill
	1	nil
2.31	10	tab dad bed tell Lem Bess bib dim mum sun
	9	nab mad Ned bell mess sib Tim bum bun
	8	lab sad Ted Nell Tess nib Lum pun
	7	Bab bad led Del Les sum nun
	4	dab pad Mel dun
	2	lad sell
	2	Tad pell
2.41	10	slat Glen stet slid spill slip spit snub Spud smut
	6	plat slen still blip slit stub stud
	3	spat snip snit

Table 4 presents the 0th-order generalization test items for Units 1-10 content; Table 5, those for 1st- and 2nd-order generalization tests. Note that a few of the sight words introduced during Units 1-5 instruction have become rule words on completion of Unit 10 instruction by virtue of the introduction of appropriate rules during Units 6-10 instruction. As the rule base expands the sight word domain contracts. In Table 5, when "sample" and "remainder" are shown, sample items are those for a first test and remainder items are what is left for purposes of later testing. Where the test consists of few enough items to be shown in one row, then the first row reflects first test items and later rows what is left for purposes of later testing.

Criterion Levels

In Tables 3 and 5, any (sample) first test consists of one item per generalization tested. Thus, in Table 5, the (sample) first test of Test 1.31 asks the child to generalize from learned consonant rules and learned blends ACK, BACK, PACK and in consequence to produce an accurate pronunciation of the item JACK. Noise effects inoperative, we assume that accurate pronunciation of JACK indicates that HACK, LACK, MACK, RACK, SACK, SHACK, TACK also would be pronounced correctly if tested and that an incorrect pronunciation of JACK would signify the converse. However, noise effects will be operative under normal reasonable testing conditions. Hence, we might assume that errors on Test 1.31 are due to noise effects alone if the proportion of errors does not exceed a certain constrained level--e.g., 5%, or two errors.

Table 4

Units 6-10: Program and Supplemental Word Attack Words and Word Elements[a]

0th-Order Test	Number of Items	Items
0.0	21	A ALL ARE [illegible] FROM GO HAS HIS I IS LOG[b] NOW OF OUT PLAY PU[illegible]HE THERE TO WANT YOU
0.11	22	B10 C10 CK10 D10 F10 G12 H10 J10 K10 L10 M10 N10 P10 R10 S10 SH10 T10 TH11 TH13 W10 X10 Y10
0.12	7	A15 E15 E25 EE10 I15 O15 U15
0.21	42	ack ad AM ANN ap ass ash at ath ell em en es et eed eep ick id ig ill im IN ip is IT ith ix ob ock ON op ot ox ub ud uff um un UP US ush ut
0.22	7	BE HE ME ree SEE SHE WE
0.31	75	BACK-pack lad-mad CAN-man nap-cap sass-pass DASH-mash NAP-PAT PATH-bath FELL-YELL THEM-hem DEN-men YES-Bess LET-WET-YET NEED-feed KEEP-deep Rick-sick DID-hid DIG-big LIL-HILL-WILL MIM-dim SHIP-TIP THIS-hiss PIT-SIT WITH[c] FIX-six JOB-Bob ROCK-sock hop-pop NOT-got BOX-fox TUB-rub BUD-MUD RUFF-cuff gum-hum FUN-RUN rush-mush CUT-TUT
0.32	13	amp AND ant asp ASK elp elm ent ext ond ump ust usk
0.41	22	GLAD-clad SNAP-slap GRASS-brass TRICK-crick STILL-spill SWIM-slim SLIP-flip TRIP-grip STOP-slop DRUM-crum BRUSH-crush
0.42	18	CAMP-damp BAND-LAND MASK-task HELP-kelp TENT-WENT NEXT-text POND-fond JUMP-pump JUST-MUST
CCV	2	TREE-free

[a]Upper case items are program words; lower case, supplementary word attack words or elements of program words referencing to higher-order generalization tests.

[b]Words ending in O15 G12 tend to vary slightly in vowel pronunciation with idiolect. If pronunciation of such words is accepted as O15 G12, then LOG classifies at 0.31 and og at 0.21.

[c]_ith has quite restricted productivity. There is no apt CVCC contrast for WITH.

Table 5

Post-Unit 10 Testing: Item Universes for 1st- & 2nd-Order Generalization Tests

Universe	Number Items	Items
1.21	16	ab ag ak eck ed eg ib ish od om oss osh uck ug eel een
1.31	36	(Sample) Jack bad fan rap gas cash cat math bell Lem hen less get weed jeep Dick lid pig Bill Jim lip kiss hit mix rob lock mop hot sox cub dud buff sum sun hush nut
	208	(Remainder) hack lack Mack rack sack shack tack cad dad fad had pad sad Tad Thad ban Dan Jan lan Nan pan ran San Tan than gap Hap lap map pap rap sap yap bass Cass lass mass tas bash gash hash lash rash sash bat fat hat Matt rat sat tat that hath lath Rath dell hell jell Mel Nell pell sell shell tell well Lem Ben Ken Len Penn pen then ten yen Fess Hess Jess Les Tess Wes bet jet met net pet set deed heed (reed) beep peep seep sheep weep hick lick nick pick tick thick wick bid mid rid Sid fig gig rig wig dill fill Gil Jill kill mill nil pill rill sill till Kim rim Tim dip hip Kip nip pip rip sip miss Sis bit fit Kit lit mitt nit wit nix cob fob gob hob lob mob sob cock dock hock mock pock shock tock bop cop sop shop top cot dot jot lot pot rot sot shot tot Cox pox Bub dub hub nub pub sub Fudd Jud sud thud Duff guff huff muff puff bum Lum mum rum yum bun gun Munn nun pun shun gush lush shush but gut hut jut mutt putt rut Sut shut
1.32	5	ast eld end ont usp
1.41	11	blad scap crass brick skill skim clip drip scop trum thrush
	4	slad Frick, swill blip
	1	prick
1.42	8	lamp hand bask yelp rent (--) bond dump dust
	7	Hamp Rand cask bent -yond bump bust
	6	ramp sand Lask dent Gump gust
	4	tamp Kent hump lust
	3	Lent lump rust
	2	-ment rump
	2	pent sump
	2	sent thump

Table 5, page 2.

Universe	Number Items	Items
2.31	16 (Sample)	jab tag Max deck fed leg rib dish God Tom Ross gosh duck bug feel seen
	93 (Remainder)	

Bab	bag	lax	Beck	bed	beg	bib	fish
cab	gag	sax	heck	Jed	keg	fib	Gish
dab	hag	tax	neck	led	Meg	jib	wish
gab	jag	wax	peck	Ned	Peg	nib	
jab	lag			red	yegg		
lab	nag			shed			
nab	rag			Ted			
tab	sag			wed			
	shag						
	wag						

cod	Dom	boss	bosh	buck	dug	heel	keen
Dodd	mom	Foss	josh	Huck	hug	keel	peen
hod		hoss		luck	jug	peel	sheen
mod		joss		muck	lug	reel	teen
nod		loss		Puck	mug		
pod		moss		suck	pug		
rod		toss		shuck	rug		
sod				tuck	tug		
shod					thug		
Todd							

2.41	38	(Sample) black grad slam span clap glass crash flat Grath smell stem Glen dress fret speed sleep stick skid brig drill trim grin drip bliss spit Smith (--) blob clock (--) drop spot (--) club spud stuff plum spun (--) plus blush glut
	126	(Remainder)

clack	brad	blam	clan	flap	clash	slat	Prell	Clem	Bren
slack	scad	clam	plan	trap	flash	brat	Snell		
crack	spad	flam	bran		slash	frat	spell		
track		cram	Fran		brash	prat	swell		
smack		dram	scan		trash	scat			
snack		gram	span		smash	spat			
stack		tram	Stan						

Table 5, page 3.

Universe	Number Items	Items								
2.41 (cont.)		bless	bleed	creep	click	slid	swig	frill	brim	skin
		cress	breed	steep	flick	grid		grill	grim	spin
		press	creed	sweep	slick			shrill		
		tress	greed					trill		
			Sneed					thrill		
			steed							
		grip	Criss	flit	glob	block	clop	blot	fulb	crud
		trip	Swiss	slit	slob	flock	flop	clot	drub	stud
		skip		grit	snob	smock	plop	plot	grub	
		snip		skit		stock	crop	slot	shrub	
				snit			prop	trot	snub	
								Scot	stub	
								snot		
		bluff	Blum	stun	turss	flush	slut			
		fluff	glum			plush	smut			
		scuff	slum			slush				
		snuff	scum							
			swum							
2.42	5	fast	weld	lend	font	cusp				
	18	cast	geld	bend	Pont					
		last	held	fend	Yont					
		mast	meld	hend						
		past		mend						
				pend						
				rend						
				send						
				tend						
				wend						

Further, since following Units 11-20 instruction will provide additional relevant training involving C+ack constructions, we might accept some proportion of errors due to nonlearning on the view that such instruction is so interlocking that it is bound to overcome occasional deficiencies. Hence, we might assume that an error proportion of .20--7 errors on Test 1.31, two attributable to noise and five to nonlearning--would be overcome routinely in later instruction without our having to take the trouble to pinpoint deficiencies or to recycle the child specifically to deal with these deficiencies.

Accepting the foregoing assumptions, what will an error proportion in excess of .20 on a first Test 1.31 portend? One approach would be to draw a new sample from the Test 1.31 remainder of Table 5, to administer this test immediately, and to be guided by how the two tests compare. If the pattern of errors on the two tests is approximately the same from test to test, then one might recycle the child to word attack instruction dealing with those generalization items failed on both tests. If the pattern of errors on the two tests is quite dissimilar from test to test, an idiosyncratic noise problem would be indicated, since the chance probability of getting any item correct is quite low.[7]

It seems not unreasonable that advancement to following instruction should be conditional on proficiency on the order of .95 for 0th-order generalization tests, .80 for 1st-order generalization tests, and

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[7] The major difficulty with the foregoing scheme is that generalization item universes are quite restricted at the introductory level of oral reading instruction. It would not always be possible to form two parallel tests.

.25-.50 for 2nd-order generalization tests, where these levels of accuracy are obtained under specified but liberal response latency and response duration criterion conditions. Perhaps an exception to these accuracy requirements might be made for program sight words (Test 0.0). Accuracy of pronunciation of sight words will be only slightly enhanced by phonics-based word attack instruction (depending on degree of irregularity). Thus, we might require .80 proficiency for program sight words, .95 proficiency for all other 0th-order tests, .80 for all 1st-order tests, and .25-.50 for all 2nd-order tests.

Table 1 reveals that the Post-Unit 10 test battery contains 17 tests. Let us ignore 0th-order tests for SW, C, V, and CV (Tests 0.0, 0.11, 0.12, and 0.22). What is left is five 0th-order, five 1st-order, and three 2nd-order tests. Applying the same reasoning to test failures as was used earlier concerning item failures, we might allow the child to fail to reach criterion on one of the tests of the set (1.32, 1.41, 1.42) and on one of the tests of the set (2.41, 2.42) and still advance to Units 11-20 instruction, on the assumption that the interlocking nature of continuation instruction should remediate these deficiencies before next testing--e.g., following negotiation of Unit 15 instruction.

Implications

The evaluation scheme sketched above implies a high degree of individualization of the word attack phase of oral reading instruction and an acceptance of the primacy of evaluation as a basis for deciding whether to advance or recycle the child. It also implies models for

the design and development of word attack instruction that constrain these operations a good deal more than is customary in present practice. In effect, the evaluation scheme is a call to innovation that goes beyond the rhetorical dependency of many who would be educationally innovative.

APPENDIX A

ORDERS OF GENERALIZATION

Notational Conventions

P - A pairing operation whose lefthand term is a written-form expression (e.g., c, V+C) and whose righthand term is a modeled correct response (e.g., Rc + 1).

c - A written-form consonant whose letter-sound rule remains to be learned.

v - A written-form vowel whose letter-sound rule remains to be learned.

C - When a component of an expression to the right of an arrow, a consonant element of a learned response; when a component of an expression to the left of P, a consonant element of a previously-learned response now to be paired with another previously-learned response to form a higher-level blend.

V - The vowel equivalent of C.

R...=1 - The modeled correct response--e.g., RV+C=1, the correct blending of V and C elements of a VC blend, performed by the teacher or other delivery element.

n - A learning parameter that will vary with task and individual; the number of pairings required to achieve a match between performance and the modeled correct response.

+ - Used in the expression to the left of P--e.g., the expression V+C--to indicate that two previously-learned lower-level responses now are to be blended to yield a higher-level blend. (V+C does not imply any particular form of presentation of the elements V and C except that they be left-right ordered V,C and that they be so spaced that one can either emphasize the elements of which the blend is composed or the blend resulting from the combining element sounds.)

$\longrightarrow$ - Read as "yields."

$\dashrightarrow$ - Read as "will yield if nth-order generalization has occurred."

(R) - The set of previously learned letter-sound rules, where (C) + (V) = (R).

(C) - Indicative that the classification of previously learned consonant rules (C) as consonant rules has been learned.

(V) - Indicative that the classification of previously learned vowel rules (V) as vowel rules has been learned.

PA-Learned Responses (0th-Order Generalizations)

Rules (Zeroth-Level Blends)

When a written-form consonant or vowel expression (c or v) is effectively (n) paired (P) with a modeled correct articulation response (Rc=1 or Rv=1), a letter-sound rule (C or V) is said to be learned.

1. n(c P Rc=1) $\longrightarrow$ C.
2. n(v P Rv=1) $\longrightarrow$ V.

First-Level Blends

When two letter-sound rules--one each from vowel and consonant classes--that are expressed in written form (V+C or C+V) are effectively (n) paired (P) with a modeled correct blending response (RV+C=1 or RC+V=1); a first-level blend (VC or CV) is said to be learned.

3. n(V+C P RV+C=1) ⟶ VC.

4. n(C+V P RC+V=1) ⟶ CV.

Second-Level Blends

When a previously mastered consonant rule and a previously mastered VC blend expressed together in written form (C+VC or VC+C) are effectively (n) paired (P) with a modeled correct blending response (RC+VC=1 or RVC+C=1), a second-level blend (CVC or VCC) is said to be learned.

5. n(C+VC P RC+VC=1) ⟶ CVC.

6. n(VC+C P RVC+C=1) ⟶ VCC.

Third-Level Blends

When a previously mastered consonant rule and a previously mastered second-level blend are expressed together in written form (C+CVC or C+VCC) and are effectively (n) paired (P) with a modeled correct blending response (RC+CVC=1 or RC+VCC=1), a third-level blend (CCVC or CVCC) is said to be learned.

7. n(C+CVC P RC+CVC=1) ⟶ CCVC.

8. n(C+VCC P RC+VCC=1) ⟶ CVCC.

lst-Order Generalizations

First-Level Blends

Example. Given that the letter-sound rules A, E, N, and T and the first-level blends EN and AT are previously learned in consequence of PA training, then lst-order generalization could be said to occur if the correct blends AN and ET are given when the pairings A+N and E+T are presented to the child for the first time. That is:

9. If the blends V_iC_i and V_jC_j and their component letter-sound rules were previously learned in consequence of PA training, then V_i+C_j ---> V_iC_j and V_j+C_i ---> V_jC_i.

Given a V x C table referencing to several vowels and consonants, Proposition 9 asserts that if VC exemplars occur in cells ii and jj, then generalization should occur to items of cells ij and ji. If exemplars are selected to fill cells ii, jj, ... , nn, then the generalization item universe G will contain n(n-1) entries. That is, as n increases linearly, G will increase geometrically.

Proposition 9 asserts that generalization occurs to counter-diagonal cell entries to those of the exemplars. That is, in a limited sense, generalization occurs jointly across consonant and vowel dimensions, where it is not required that the child learn that some previously learned rules classify (C) and some (V). One alternative to Proposition 9 is to view generalization as occurring across a consonant dimension but not across a vowel dimension, with extent of such generalization a function of (C) and perhaps lexically-imposed or phonologically-imposed constraints of English. Let us assume that three vowel rules

(A, I, U) and three consonant rules (M, P, T) are previously learned, together with the fact that the former classify (V) and more important that the latter classify (C). In consequence, if the single blend AM has been learned through PA training, then A+P ---> AP and A+T ---> AT. Only if the blend IP also is learned through PA training will the expectations be in order that I+M ---> IM and I+T ---> IT. Only if the blend UT also is learned through PA training will the expectations be in order that U+M ---> UM and U+P ---> UP. Hence:

10. If the child has learned rules V_i, V_j, C_i, and C_j, has learned to make the classification (C), and has learned the blend V_iC_i; then V_i+C_j ---> V_iC_j. However, V_j+C_i and V_j+C_j are not apt generalization test items.

Given a V x C table referencing to several vowels and consonants, Proposition 10 asserts that if a VC exemplar occurs in every vowel row of the table, then the child will generalize to all possible VC exemplars in the row. Letting r signify number of rows (or vowels) and c the number of columns (or consonants), then the generalization item universe G will contain r(c-1) entries. That is, G will be a linear function of r where referenced to Proposition 10.

If one could legislate on such matters, then one would prefer Proposition 10 when only a few rules had been learned and Proposition 9 thereafter. Unfortunately, the question of which generalization item universe--G_9 or G_{10}--is most apt is an empirical one. Perhaps the right question is a more complex one than that mirroring a choice between these two alternatives.

Under certain conditions $G_9 = G_{10}$. This is illustrated in Table A-1, where upper case entries are PA-trained and lower case entries are apt generalization test items. Table vowels are the so-called short vowels.

CVC (Second-Level) Blends

11. If the rules V_i, V_j, C_i, C_j, C_k, and C_m and the blends V_iC_i, V_jC_j, $C_kV_iC_i$, and $C_mV_jC_j$ are previously learned in consequence of PA training, then $C_m+V_iC_i$ ---> $C_mV_iC_i$ and $C_k+V_jC_j$ ---> $C_kV_jC_j$.

Table A-1.

1st-Order Generalization Test Items for Propositions 9 and 10.

Vowel	B	D	M	N	T
A	ab	ad	am	an	AT
E	eb	ed	em	EN	et
I	ib	id	IM	in	it
O	ob	OD	om	on	ot
U	UB	ud	um	un	ut

Exemplarization of Proposition 11. If the rules A, E, N, T, B, M and the blends AN, ET, BAN, and MET are previously learned in consequence of PA training, then M+AN will yield MAN and B+ET will yield BET if generalization learning has occurred.

Proposition 11 is analogous to Proposition 9 in that it asserts that generalization occurs to counterdiagonal cell entries to those of the exemplars, but of a C x VC table. If such a table is used, r = c = n, and exemplars are selected to fill cells ii, jj, ... , nn, then the generalization item universe G will contain n(n-1) entries. The alternative is Proposition 12, which is analogous to Proposition 10.

12. If, in consequence of PA training, the child has learned rules V_i, C_i, C_j, C_k, and C_m, has learned to make the classification (C), and has learned the blends V_iC_i and $C_jV_iC_i$, then $C_k+V_iC_i$ ---> $C_kV_iC_i$ and $C_m+V_iC_i$ ---> $C_mV_iC_i$.

Exemplarization of Proposition 12. If, in consequence of PA training, the child has learned rules A, T, B, M, and P, has learned to classify T, B, M, and P into the consonant set, and has learned the blends AT and BAT, then M+AT will yield MAT and P+AT will yield PAT if generalization learning has occurred.

Given a C x VC table referencing to several consonant and VC entries, Proposition 12 asserts that if a VC exemplar occurs in every VC column of the table, then the child will generalize to all possible CVC exemplars in the column. Letting r signify number of rows (or initial consonants) and c the number of columns (or VC entries),

then the generalization item universe G will contain c(r-1) entries. (As defined here, the item universes G_{11} and G_{12} inevitably will contain some items that are not words of English.)

Like Propositions 9 and 10, under certain conditions Propositions 11 and 12 have the same generalization item universes. This is illustrated in Table A-2, where Table A-1 conventions hold. The S of the table is /s/.

Table A-2.

1st-Order Generalization Test Items for Propositions 11 and 12.

1st C	AN	AT	EN	ET	IN	IT	UN	UT
B	BAN	bat	Ben	bet	bin	bit	bun	but
D	Dan	DAT	den	det	din	dit	dun	dut
L	lan	lat	LEN	let	lin	lit	lun	lut
M	man	mat	men	MET	min	mit	mun	mut
N	Nan	Nat	nen	net	NIN	nit	nun	nut
P	pan	Pat	pen	pet	pin	PIT	pun	
S	san	sat	sen	set	sin	sit	SUN	Sut
T	tan	tat	ten	Tet	tin	tit	tun	TUT

The empty cell, where put would go, marks an irregular word perhaps signifying a need for training that heads off overgeneralization. The principle objection either to using nonsense items during PA training or in tests for generalization would probably be that if too many were used, the child might form the impression that he was learning a parlor game rather than a useful reading tool. As long as one avoids creating that impression, it ought to be acceptable to employ nonsense items occasionally where the lexicon is uncooperative.

Proposition 11 assumes an exemplar in each column and each row. Proposition 12 assumes an exemplar in each column but is indifferent to the pattern across rows. For present purposes we will view Proposition 12 as better reflecting generalization item universes for CVC blends than Proposition 11 or some other alternative.

Hereafter, propositions will be introduced in exemplarization form.

VCC (Second-Level) Blends

13. Given (R), AN, EL, AND, and ELT are previously learned in consequence of PA training, then EL+D ELD and AN+T ---> ANT.

14. Given (R), (C), AN, and AND are previously learned in consequence of PA training, where T is contained in (R), then AN+T ---> ANT.

Proposition 13 is analogous to Propositions 9 and 11; Proposition 14, to Propositions 10 and 12. Parallel developments lead to explications of generalization item universes.

CCVC (Third-Level) Blends

15. Given (R), LOT, RIM, BLOT, and GRIM are previously learned in consequence of PA training, then G+LOT ---> GLOT and B+RIM ---> BRIM.

16. Given (R), (C), RIM, and GRIM are previously learned in consequence of PA training, where B is contained in (R), then B+RIM ---> BRIM.

Proposition 15 is analogous to Propositions 9, 11, and 13; Proposition 16, to Propositions 10, 12, and 14. Parallel developments lead to explication of generalization item universes.

CVCC (Third-Level) Blends

17. Given (R), UST, AMP, DUST, and LAMP are previously learned in consequence of PA training, then D+AMP ---> DAMP and L+UST ---> LUST.

18. Given (R), (C), UST, and DUST are previously learned in consequence of PA training, where M is contained in (R), then M+UST ---> MUST.

Proposition 17 is analogous to Propositions 9, 11, 13, and 15; Proposition 18, to Propositions 10, 12, 14, and 16.

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For present purposes, 1st-order generalization item universes will be generated according to provisions of Propositions 10, 12, 14, 16, and 18.

2nd-Order Generalizations

A 2nd-order generalization is defined on a 1st-order generalization occurring at the next-lower blending level. 2nd-order generalization item universes of interest in light of blending-level constraints imposed above are those for second-level (CVC, VCC) and third-level (CCVC, CVCC) blends.

CVC (Second-Level) Blends

Table A-3 illustrates 0th-, 1st-, and 2nd-order generalization items that are CVC blends. The symbol -0 affixed to a VC or CVC item indicates that the item is 0th-order. The symbol -1 indicates 1st-order. The symbol -2 indicates 2nd-order. Initial consonants are 0th-order.

Table A-3.

Illustrative 0th-, 1st-, and 2nd-Order CVC Generalization Test Items.

1st C	AM-0	an-1	at-1	im-1	in-1	IT-0	um-1	UN-0	ut-1
L	lam-1	lan-2	lat-2	lim-2	lin-2	LIT-0	lum-2	lun-1	lut-2
M	mam-1	man-2	mat-2	mim-2	min-2	mit-1	mum-2	mun-1	mut-2
P	pam-1	pan-2	pat-2	pim-2	pin-2	pit-1	pum-2	PUN-0	
R	RAM-0	ran-2	rat-2	rim-2	rin-2	rit-1	run-2	run-1	rut-2

The VC items AM, IT, and UN are PA-trained, yielding the other exemplarized VC items as 1st-order generalization. The 1st-order CVC items are defined on the PA-trained, or 0th-order, VC items, while the 2nd-order CVC items are defined on the 1st-order (nontrained) VC items. The 0th-order CVC items are PA-trained to exemplarize the CVC blend for a column. We assume that such exemplarization generalizes to the 1st-order VC generalization items.

VCC (Second-Level) Blends

Table A-4 illustrates 0th-, 1st-, and 2nd-order generalization items that are VCC blends. The S of the table is /s/. A question remaining to be answered is whether the phonology of the language, with which the child is presumed proficient, will act to repress attempts to form the generalizations ASD, USD, AMK, etc.--the empty cells of Table A-4.

Table A-4.

Illustrative 0th-, 1st-, and 2nd-Order VCC Generalization Test Items.

2nd C	am-1	an-1	AS-0	um-1	un-1	US-0
D		and-2			und-2	
K			ASK-0			usk-1
P	amp-2		asp-1	ump-2		usp-1
T		ant-2	ast-1		unt-2	UST-0

CCVC (Third-Level) Blends

Table A-5 illustrates 0th-, 1st-, and 2nd-order generalization items that are CCVC blends. The S of the table is /s/. The notation cAN-1, pAN-1 indicates that the first-level blend (AN) was PA-trained, but not the second-level blend (CAN, PAN).

CVCC (Third-Level) Blends

Table A-7 illustrates 0th-, 1st-, and 2nd-order generalization items that are CVCC blends. The S of the table is /s/. The notation ASt-1, USk-1 indicates that the first-level blend (AS, US) was PA-trained, but not the second-level blend (AST, USK).

Table A-5.

Illustrative 0th-, 1st-, and 2nd-Order CCVC Generalization Test Items.

1st C	cAN-1 pAN-1 tAN-1	LAM-0	rAM-1
B		blam-1	bram-2
C		clam-1	cram-2
D			dram-2
F		flam-1	fram-2
G		glam-1	gram-2
P			pram-2
S	scan-2 span-2 Stan-2	SLAM-0	
T			tram-2

Table A-6.

Illustrative 0th-, 1st-, and 2nd-Order CVCC Generalization Test Items.

1st C	ASK-0	ASp-1 ASt-1	USk-1 USp-1	UST-0
B	bask-1			bust-1
C	cask-1	cast-2	cusp-2	
D			dusk-2	DUST-0
F		fast-2		
G		gasp-2		gust-1
H		hasp-2	husk-2	
J				just-1
L		last-2	Lusk-2	lust-1
M	MASK-0	mast-2	muck-2	must-1
P		past-2		
R		rasp-2	Rusk-2	rust-1
T	task-1		tusk-2	

3rd-Order Generalizations

Third-level blends permit definition of 3rd-order generalization test items. These are built on 2nd-order generalization test items at the second level, which are built on 1st-order generalization test items at the first level. It is doubtful that 3rd-order generalization learning requirements would be of interest.

Generalization to Rhyming and Alliterative Items

Exemplarizations of 1st-order generalization have involved a particular form of rhyming--C + Lower-Level Blend. Thus, if the blends CAMP and AMP are PA-trained, along with certain letter-sound rules and differentiation of the consonant set, then we expect the child to respond appropriately to DAMP and LAMP if 1st-order generalization has occurred. The shared element of CAMP, DAMP, and LAMP is _AMP. For those CCVC items beginning with SC, SK, SM, SN, SP, ST, or SW, there can be no generalization item universe of 1st-order if the shared element on which rhyming occurs is of the form _CVC. Rather, it must be in the case of such items C_VC, the shared element of such rhyming items as SCAN and SPAN, SMACK and SNACK, and STILL and SWILL. (There is a very circumscribed basis for rhyming SW words using the shared element _CVC--e.g., SWELL-DWELL, SWILL-TWILL. However, few words begin with DW, GW, or TW, the obvious contrasts with words beginning with SW.)

Such items as SCAN and SKIT contrast alliteratively. Empirical observation may reveal that SC, SK, SM, SN, SP, ST, SW (and for that matter BL, CL, FL, GL, PL, SL, BR, CR, DR, FR, GR, PR, SHR, TR, THR,

DW, GW, TW) can be blended readily and sufficiently enough that they should be treated as word elements analogous to VC word elements. Were that so, then a third-order blend CCVC might be effec ed through combination of CC and VC word elements. Such a view of blending would overturn much that has been said above regarding orders of generalization. For one defines orders of generalization on some view concerning the building of blends from lower to higher levels.

Concluding Comment

The foregoing view of blending instruction is heuristic in that it is used primarily to illustrate how a vague "transfer of training" requirement of phonics-based word attack instruction might be replaced by a more explicit framework underlying specification of orders of generalization to be evaluated. It might also be taken as an empirical model in the restricted sense that it provides an unequivocal point of departure against which rational and empirical efforts to produce a superior model might be referenced.

Appendix B.

Separating Children Who Generalize Letter-Sound Rules and Exemplary Blends from Children Who Don't

Preliminary Illustration

We consider first a training-testing program based on a limited rule base and a limited number of constructional forms.

Assumptions

1. In consequence of PA instruction, the child is proficient in articulating the sounds of the following letter-sound rules when the letter is presented in written form and in pronouncing the following blends presented in written form: A15, B10, C10, CK10, D10, F10, G12, J10, L10, M10, N10, P10, R10, S10, T10, AB, ACK, AD, AG, AM, AN, AP, and AT. (Rule notation is that of SWRL TR15.)

2. Initial word attack instruction contrasts a) two CVC constructions having each of the VC endings cited above--e.g., CAB-TAB, BACK-MACK--and b) two CCVC constructions having each of the VC endings for the cases where L10 and R10 are the immediately preceding consonant--e.g., SLAB-FLAB, BLACK-CLACK, TRAB-GRAB, BRACK-CRACK.

3. The object of word attack instruction is that the child reach criterion performance on appropriate 0th-order and 1st-order (context-free) generalization tests.

Training and Testing

Materials are illustrated in Table B-1. Upper case items are those used during initial word attack instruction and so are 0th-order

generalization test items. Lower case items are appropriate to 1st-order generalization tests in consequence of the instruction assumed above.

Table B-1.

Illustrative Word Attack Instructional and Test Items.

Construction	AB	ACK	AD	AG	AM	AN	AP	AT
CVC	CAB	BACK	FAD	HAG	DAM	JAN	GAP	RAT
	TAB	MACK	SAD	NAG	RAM	PAN	LAP	BAT
	bab	hack	pad	tag	jam	man	map	cat
	dab	Jack	mad	lag	lam	ran	Hap	fat
	gab	lack	lad	jag	Sam	tan	cap	hat
	jab	pack	had	gag	bam	ban	tap	mat
	lab	sack	cad	fag	cam	Dan	sap	pat
	nab	tack	bad	bag	ham	can	rap	sat
ClVC	SLAB	BLACK	GLAD	FLAG	CLAM	PLAN	SLAP	PLAT
	FLAB	CLACK	PLAD	CLAG	BLAM	GLAN	FALP	SLAT
	glab	slack	clad	plag	slam	flan	plap	clat
	blab	flack	flad	slag	glam	blan	clap	flat
CrVC	TRAB	BRACK	PRAD	CRAG	DRAM	FRAN	GRAP	PRAT
	GRAB	CRACK	BRAD	PRAG	CRAM	GRAN	TRAP	FRAT
	crab	grack	trad	drag	fram	bran	drap	crat
	drab	track	grad	brag	tram	dran	frap	brat

Let us imagine that Assumption 1 has been met and that training inherent in Assumption 2 has conveyed how one blends CVC and CCVC items formed on the word elements mastered in Assumption 1 training. Evaluation will indicate whether the child should advance to word attack instruction involving new rules, VC word elements, and constructional types or recycle through portions of the instruction described above. Such an evaluation will be a <u>first</u> evaluation.

The first Oth-order CVC test will use one item randomly drawn from each CVC upper-case pair of Table B-1. Assuming rule-referenced randomization of the tabled items such that each row can be considered equally comprehensive and difficult, the first lower-case CVC row of items can be used for a first lst-order CVC test.

If the child reaches criterion performance on both tests, one might conclude that no further CVC word attack instruction involving these rules, VC endings, and constructional types would be required. If the Oth-order test is passed and lst-order test is failed, then the child might be recycled to word attack instruction whose materials are drawn from the first three CVC rows of the table--the two upper case rows and the first lower case row. Items of the second lower case row might then be used in a second lst-order test following additional instruction.

The child might be recycled on failing each new lst-order test. The train-test-recycle routine would have to terminate following administration of the sixth lst-order test, since lst-order test materials then would be exhausted.

A similar train-test-recycle routine might be employed regarding ClVC and CrVC constructions. However, availability of materials for these constructions are such that the routine would need be terminated following administration of a second 1st-order test.

Outcomes

Under the conditions sketched above, one of three outcomes is inevitable: a) The child will reach criterion on 0th-order and 1st-order generalization tests with little recycling, signifying that both recognition and generalization learning are occurring. b) He will consistently reach criterion on 0th-order tests but will exhaust 1st-order tests without reaching criterion, signifying that recognition learning is occurring but not generalization learning. c) He will consistently fail to reach criterion on either type of test, signifying that he will never learn to read under conditions of the current instructional program.

Let us hope that no general-category children will be associated with the third outcome. It seems possible that some children will be characterized by the second outcome. At some point following an extended effort to train these children to take advantage of generalization bases for expanding sight vocabulary, it might make sense to conclude that they will profit only from an intensive sight word approach to vocabulary expansion. For them, word attack vocabulary selection might thereafter be based entirely on utility of the item in current and later nonreading instruction. Before reaching such a conclusion, one should insure that the instructional base is sufficiently

broad to warrant the sweeping generalization that phonics-based instruction has had its chance and been found wanting. Below is generated an appreciable early word attack instructional content that might be used to reach such decisions.

Extended Illustration

Letter-Sound Rule Base

The rule base for an illustrative appreciable word attack content consists of the following: a) Primary short vowel rules--A15, E15, I15, O15, U15. b) Primary long vowel rules, graphemically represented by appending E18 (silent e) to a VC item having a V15 rule as its vowel--A11, E11 (seldom used), I11, O11, U11--so that A15T10 becomes A11T10E18, I15N10 becomes I11N10E18, O15B10 becomes O11B10E18, U15M10 becomes U11M10E18. c) Consonant rules whose graphemic element is single or geminate--B10, C10, D10, F10, G12, H10, J10, K10, L10, M10, N10, P10, R10 (used only before a vowel), S10, T10, W10. d) Consonant rules whose graphemic element is a cluster--CK10, SH10, TH11, TH13, TCH10.

Thus the rule base consists of 31 rules--five V15-V11 pairs, 16 consonant rules involving single or geminate graphemes, and five consonant rules involving grapheme clusters. Each rule reflects a "one phoneme" sound, unlike X10 which reflects a "two phoneme" sound. Most of these rules are quite productive; taken together, they yield a rather large number of one-syllable constructions having immediate or deferred utility. (Words intuitively classified below as familiar are considered to have immediate utility. Unfamiliar words and syllables that do not stand alone but enter into useful higher-level one-syllable words or useful two-syllable words have deferred utility.)

One-Syllable Constructions

Content is developed in terms of the following constructional types: CVC, CVCe, CVCC, CCVC, CCVCe, CCVCC, CCCVC, CCCVCe, and CCCVCC. Underlying VC and VCC constructions are of interest but were not inventoried. About all that remains at the one-syllable level are CV (e.g., BE, BEE), CCV (e.g., PRE-, TREE), and CCCV (e.g., SPREE) constructions, also not inventoried, whose domains are quite limited. (Had that not been the case, the long vowel rules E25 and EE10 would have been included in the rule base.)

The illustrative extended content appears in Tables B-3 and B-4. Table B-2 presents counts of tabled one-syllable items by type of construction and status (productive nonsense item, unfamiliar word, familiar word). Status classifications were intuitively reached, with words classed as familiar if considered in the speech vocabulary of kindergarten children and as unfamiliar if considered in the speech vocabulary of second or third graders but not in the speech vocabulary of kindergarteners. Productive nonsense items also were referenced to the speech vocabularies of the older children.

As is indicated in Table B-2, constructions of interest yield 435 familiar one-syllable words, 759 unfamiliar one-syllable words (many of which can be expected to occur in the speech vocabularies of children in the second and third grades and so should be treated in early word comprehension instruction), and 481 nonword items that are parts of higher-level one-syllable word blends or syllables of two-syllable words, many of which are familiar. Most of these 1675 items occur in

Table B-2.

One-Syllable Words and Productive Nonwords Inherent in the Extended Rule Base[a]

Item Classification	CV	CVCe	CCVC	CCVCe	CVCC	CCVCC	CCCVC	CCCVCe	CCCVCC	Total
Productive Nonsense Items	287	4	153	3	5	2	25	1	1	481
Unfamiliar Words	231	118	186	59	88	51	11	10	5	759
Familiar Words	190	59	86	20	50	17	11	1	1	435
Totals	708	181	425	82	143	70	47	12	7	1675

[a]R10 was not allowed following the vowel because V+R10 introduces vowel rules not treated. H10, J10, and W10 are not allowed following a vowel.

constructions having three or four phonemes--889 are three-phoneme (CVC, CVCe) and 650 are four-phoneme (CVCC, CCVC, CCVCe). The distribution of items across an item length dimension, not unexpected, suggests that comprehensive testing of 1st-order generalization skill will need be referenced to constructions at the three-phoneme and four-phoneme levels (second-level and third-level construction).

The train-test program implied here takes perhaps the simplest possible view of what constitutes evidence for generalization learning. What is required is 1st-order generalization to an item that rhymes with a PA-trained exemplar. Rhyming items of Table B-1 share all but the initial consonant. Thus, FLAB, GLAB, and BLAB rhyme on the basis of a shared element _LAB. If only this type of rhyme is used, then it becomes necessary to treat all CCVC items beginning with S10 save those whose second consonant is L10 as unevaluable for 1st-order generalization. SCAN, SPAN, and STAN also rhyme, but on the basis of a shared element S_AN. For the limited number of CCVC items beginning with S10, generalization tests based on such rhyming is acceptable.

Generalization through alliteration (head-rhyming) is higher than 1st-order. While one might expect, under training conditions sketched above but with certain exemplars withheld that some children would generalize from GLAD to GLEN and from STAB to STOP, we do not require the child to show evidence of ability to negotiate higher-order generalization test items as a condition for his classification as a rule-blend generalizer. (Such evidence might be used to differentiate

generalizers into subclasses for purposes of formulating and pacing instruction; however, this appendix addresses the prior problem of classifying children into generalizer-nongeneralizer classes.).

Table B-3.

Domains of CVC Units.

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
bab	BABE		BABBLE				
BACK							
BAD	BADE						
baf			BAFFLE				
BAG			BAGGAGE				
bak	BAKE						
bal	BALE		BALLOT				
BAM							
BAN	BANE	BAND	BANTER				
bas	BASE	BASK	BASKET				
BASH			BASHFUL				
BAT	BATE		BATTLE				
BATH							
BATCH							
CAB			CABIN	SCAB			SCABBARD
CAD			CADDY	SCAD			
caf				scaf			SCAFFOLD
cak	CAKE						
cal	KALE		CALLOW	scal	SCALE	SCALP	SCALLOP
CAM	CAME	CAMP	CAMEL	scam		SCAMP	SCAMPER

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
CAN	CANE		CANDLE	SCAN		SCANT	SCANDAL
CAP	CAPE		CAPTURE	scap	scape		
cas	CASE	CASK CAST	CASTLE				
CASH							
CAT	KATE		CATTLE	SCAT	SKATE		SCATTER
CATCH							
KEG							
kel		KELP	KELLER	skel			SKELTER
kem		KEMP					
KEN		KENT	KENNEL				
kep		KEPT		skep			SKEPTIC
ket			KETTLE				
KETCH				SKETCH			
KICK							
KID			KIDNAP	SKID			
kif				SKIFF			
KILL		KILT		SKILL			
KIM				SKIM		SKIMP	
KIN				SKIN			
kip				SKIP			SKIPPER
KISS							
KIT	KITE			SKIT			SKITTISH
KITH							

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
COB			COBBLE				
COD	CODE		CODDLE				
cof			COFFEE	SCOFF			
COG							
cok	COKE						
col	COLE		COLLAR				
com			COMMA				
con	CONE		CONTEST	scon	SCONE		
COP	COPE		COPTER	scop	SCOPE		
cos		COST	COSTUME				
COT			COTTON	SCOT			
cotch				SCOTCH			
CUB	CUBE		CUBBY				
CUD			CUDDLE	SCUD			
CUFF				SCUFF			SCUFFLE
CULL		CULT	CULPRIT	SCULL		SKULP	
cum				SCUM			
CUP				SCUP			
CUSS	-cuse	CUSP	CUSTOM				
CUT	CUTE						
DAB			DABBLE				
DAD	DADE						

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
daf		DAFT	DAFFY				
dag			DAGGER				
dal	DALE						
DAM	DAME	DAMP	DAMPER				
DAN	DANE		DANDY				
dap			DAPPER				
DASH							
dat	DATE						
deb			DEBBIE				
DECK							
def		DEFT					
dek	DEKE						
del			DELTA				
DEN		DENT	DENMARK				
des		DESK					
DICK			DICKER				
DID							
dif			DIFFER				
DIG							
dik	DIKE						
DILL							
DIM	DIME		DIMPLE				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
DIN	DINE	DINT	DINNER				
DIP							
dis		DISK	DISPLAY				
DISH							
DIT			DITTO				
DITCH							
dob			DOBBIN				
DOCK							
doc			DOCTOR				
DOFF							
DOG			DOGMA				
DOLL	DOLE		DOLLAR				
dom	DOME						
DON							
dop	DOPE						
dos	DOSE						
DOT	DOTE						
DUB							
duc		DUCT					
DUCK							
DUD	DUDE		DUDLEY				
DUFF			DUFFEL				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
DUG			DUGOUT				
duk	DUKE						
DULL			DULLARD				
dum		DUMP	DUMMY				
DUN	DUNE						
dup	DUPE						
dus		D''SK DUST					
DUTCH							
FAD	FADE		FADDLE				
FAG			FAGGOT				
fak	FAKE						
fac		FACT	FACTOR				
fal			FALLOW				
fam	FAME		FAMISH				
FAN			FANNY				
FAT	FATE						
FED							
FELL			FELLOW				
fen		FEND	FENDER				
fes		FEST	FESTER				
fe			FETTLE				
FETCH							

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
FIB							
fid			FIDDLE				
fick			FICKLE				
fif	FIFE						
FIG							
FILL	FILE	FILM	FILTER				
FIN	FINE						
fis		FIST					
FISH							
FIT							
FOB							
fod			FODDER				
FOG							
fol			FOLLOW				
fon		FOND					
FOP							
fos			FOSTER				
fum	FUME		FUMBLE				
FUN		FUND	FUNNEL				
FUSS							
fut	-fute						
gab	GABE		GABBY				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
GAFF							
GAG	GAGE		GAGGLE				
GAL	GALE		GALLON				
gam	GAME		GAMBLE				
gan			GANDER				
GAP	GAPE						
GAS		GASP	GASKET				
GASH							
gat	GATE						
GET							
gif		GIFT					
GIG							
GILL		GILT	GILBERT				
gim		GIMP	GIMMICK				
GOB			GOBBLE				
GOD							
gog			GOGGLE				
gol		GOLF					
gos			GOSSIP				
GOSH							
GOT							
GOTH							

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
GUFF							
GULL		GULF GULP	GULLY				
GUM			GUMBO				
GUN			GUNNY				
gup			GUPPY				
GUS		GUST	GUSTO				
GUT			GUTTER				
hab			HABIT				
HACK			HACKLE				
HAD							
HAG			HAGGARD				
hak	HAKE						
HAL	HALE		HALLOW				
HAM	HAME		HAMMER				
han		HAND	HANDY				
HAP			HAPPEN				
HASH							
HAT	HATE		HATTER				
HATCH							
hec			HECTIC				
hef		HEFT	HEFTY				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
HELL		HELD HELM HELP	HELMET				
HEM		HEMP					
HEN			HENRY				
hic			HICCUP				
HID	HIDE						
HICK							
HILL		HILT					
hik	HIKE						
HIM							
hin			HINDER				
HIP			HIPPO				
HISS							
HIT							
HITCH							
HOB			HOBBLE				
HOCK			HOCKEY				
HOD							
HOG							
hol	HOLE		HOLLOW				
hom	HOME		HOMBERG				
hon	HONE						

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
HOP	HOPE		HOPPER				
HOSS			HOSTILE				
HOT							
HUB			HUBBARD				
HUCK			HUCKSTER				
hud			HUDDLE				
HUFF							
HUG							
HULL		HULK					
HUM	HUME	HUMP	HUMBLE				
HUN		HUNT	HUNDRED				
hus		HUSK	HUSTLE				
HUT							
HUTCH							
JAB			JABBER				
JACK			JACKAL				
jad	JADE						
JAG			JAGUAR				
jak	JAKE						
JAM							
JAN	JANE						
jap	JAPE						

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
jas			JASPER				
JEB							
JED							
JEFF							
JELL			JELLY				
jen			JENNY				
JESS		JEST					
JET							
JIB	JIBE						
jif			JIFFY				
JIG			JIGGLE				
JILL		JILT					
JIM			JIMSON				
jit			JITTER				
JOB							
JOCK			JOCKEY				
JOG			JOGGLE				
jok	JOKE						
jol			JOLLY				
JOSH							
jos			JOSTLE				
JOT							

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
JUD	JUDE						
JUG			JUGGLE				
juk	JUKE						
jum		JUMP					
jun	JUNE						
jus		JUST	JUSTICE				
JUT	JUTE						
LAB				BLAB			BLABBER
				flab			FLABBY
				SLAB			
LACK			LACKEY	BLACK			
				CLACK			
				SLACK			
LAD	LADE		LADDER	blad	BLADE		BLADDER
				CLAD			
				GLAD	GLADE		
LAG			LAGGARD	FLAG			
				SLAG			
lak	LAKE			blak	BLAKE		
				FLAK	FLAKE		
				slak	SLAKE		
LAM	LAME	LAMP	LAMPOON	BLAM	BLAME		
				CLAM		CLAMP	CLAMOR
				flam	FLAME		
lan	LANE	LAND	LANTERN	blan		BLAND	
				CLAN			
				flan			FLANNEL
				glan		GLAND	
				PLAN	PLANE	PLANT	PLANET
				slan		SLANT	SLANDER

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
LAP				CLAP			
				FLAP			
				SLAP			
LASS		LAST	LASSO	blas		BLAST	
				CLASS		CLASP	CLASSIC
				flas		FLASK	
				GLASS			
				plas			PLASTIC
LASH				CLASH			
				GLASH			
				-flash			
				SLASH			
lat	LATE			clat			CLATTER
				FLAT	-flate		
				PLAT	PLATE		
				SLAT	SLATE		
LATH							
LATCH							
leck				FLECK			
LED				BLED			
				FLED			
				PLED			
				SLED			
lec		LECTURE					
lef		LEFT		CLEF		CLEFT	
LEG							
LEM			LEMON	blem			BLEMISH
				CLEM			CLEMSON
LEN		LEND	LENTIL	blen		BLEND	
		LENT		GLEN			
				plen			PLENTY
				slen			SLENDER

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
LESS		LEST	LESSON	BLESS			
lesh				FLESH			
LET			LETTER	clet	CLETE		
lib				GLIB			
LICK				CLICK			
				FLICK			FLICKER
				SLICK			
LID				glid	GLIDE		
				SLID	SLIDE		
lif	LIFE	LIFT		CLIFF			
lik	LIKE						
lim	LIME	LIMP	LIMIT	blim		BLIMP	
				glim			GLIMMER
				SLIM	SLIME		
				flim			FLIMSY
LIL		LILT	LILY				
lin	LINE	LINT	LINEN	flin		FLINT	
				glin		GLINT	
LIP				BLIP			
				CLIP			
				FLIP			FLIPPER
				SLIP			SLIPPER
lis		LIST	LISTEN	BLISS			BLISTER
LIT			LITTLE	FLIT			
				glit			GLITTER
				plit			
				SLIT			
LOB	LOBE		LOBSTER	BLOB			
				clob			CLOBBER
				GLOB	GLOBE		
				SLOB			

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
LOCK			LOCKET	BLOCK			
				CLOCK			
				FLOCK			
lod	LODE			CLOD			
				PLOD	-plode		
lof		LOFT	LOFTY				
LOG				CLOG			
				FLOG			
				SLOG			
LOLL							
lom			LOMBARD				
lon	LONE			blon		BLOND	
LOP	LOPE			FLOP			
				PLOP			
				SLOP	SLOPE		
LOSS		LOST		blos		BLOSSUM	
				clos	CLOSE*		
				FLOSS			
				GLOSS			
losh				SLOSH			
LOT			LOTTO	BLOT			
				CLOT			
				PLOT			
				SLOT			
loth				CLOTH			
				SLOTH			
lotch				BLOTCH			
lub	LUBE		LUBBER	blub			BLUBBER
				CLUB			
				FLUB			
LUCK				CLUCK			
				PLUCK			

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
luf				BLUFF			
				FLUFF			
LUG				PLUG			
				SLUG			
luk	LUKE			fluk	FLUKE		
LULL							
LUM		LUMP	LUMBER	clum		CLUMP	CLUMSY
				flum	FLUME		
				GLUM			
				PLUM	PLUME	PLUMP	
				SLUM		SLUMP	SLUMBER
lun	LUNE			blun		BLUNT	BLUNDER
				plun			PLUNDER
lus		LUST	LUSTER	blus			BLUSTER
				clus			CLUSTER
				flus			FLUSTER
				PLUS			
LUSH				BLUSH			
				FLUSH			
				PLUSH			
				SLUSH			
lut	LUTE			clut			CLUTTER
				flut	FLUTE		FLUTTER
				GLUT			
				SLUT			
lutch				CLUTCH			
MACK				SMACK			
MAD	MADE		MADAM				
mag			MAGNET				
mak	MAKE						
mal	MALE		MALLET				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
MAN	MANE	-mand	MANNER				
man			MAMMAL				
MAP							
MASS		MASK MAST	MASTER				
MASH				SMASH			
MAT	MATE		MATTER				
MATH							
MATCH							
med			MEDAL				
MEG			MEGA				
MEL		MELD MELT	MELON	SMELL		SMELT	SMELTER
MEN		MEND -ment	MENTION				
mem			member				
MESS			MESSAGE				
MESH							
MET	METE		METAL				
mick			MICKEY				
MID			MIDDLE				
MIFF							
mik	MIKE						
MILL	MILE	MILK	MILLION	smil	SMILE		

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
mim	MINE		MIMIC				
min	MINE	MINT	MINNOW				
MISS		MIST	MISTER				
MITT	MITE		MITTEN	smith	SMITE		
mith				SMITH			
MOB							
MOCK				SMOCK			
MOD	MODE		MODEL				
mog				SMOG			
mok				smok	SMOKE		
MOLL	MOLE		MOLLY				
MOM							
mon			MONSTER				
MOP	MOPE						
MOSS							
mot			MOTTO	smot	SMOTE		
MOTH							
MUCK							
MUD			MUDDLE				
MUFF			MUFFLER				
MUG				SMUG			SMUGGLE
MULL	MULE						

CVC	CVCe	CVC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
m			MUMBLE				
mun			MUNDANE				
MUSS		MUSK MUST	MUSTANG				
MUSH							
MUTT	MUTE		MUTTER	SMUT			
NAB							
nack				SNACK			
NAG				SNAG			
nak				snak	SNAKE		
nam	NAME						
NAN			NANNY				
NAP	NAPE		NAPKIN	SNAP			
nas			NASTY				
NAT	NATE						
natch				SNATCH			
NECK							
nec			NECTAR				
NED							
NELL			NELSON				
nes		NEST	NESTLE				
NET			NETTLE				
NIB			NIBBLE				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
NICK			NICKEL	snick			SNICKER
nid				snid	SNIDE		
nif			NIFTY	SNIFF			SNIFFLE
NIL	NILE						
nim			NIMBLE				
nin	NINE						
NIP			NIPPLE	SNIP	SNIPE		
NIT			NITWIT	SNIT			
nitch				SNITCH			
NOB				SNOB			
NOD	NODE						
nog			NOGGIN				
nom	NOME						
NON			NONSENSE				
nop	NOPE						
nos			NOSTRIL				
NOT	NOTE			SNOT			
NOTCH							
NUB				SNUB			
nud	NUDE						
nuf				SNUFF			
nug			NUGGET	SNUG			SNUGGLE

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
NULL							
num			NUMBER				
NUN							
NUT			NUTMEG				
PACK			PACKAGE				
pac		PACT					
PAD			PADDLE	spad	SPADE		
PAL	PALE		PALACE				
PAM			PAMPER				
PAN	PANE		PANIC	SPAN			SPANIEL
PASS		PAST	PASTIME	spas			SPASTIC
PAT	PATE		PATTERN	SPAT	SPATE		
PATH							
PATCH							
PECK				SPECK			
ped	-pede		PEDDLE	SPED			
PEG							
pel		PELT	PELLET	SPELL			
PEN		PEND PENT	PENCIL	spen		SPEND SPENT	
PEP			PEPPER				
pes		PEST	PESTER				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
PET	PETE		PETAL				
PICK			PICKLE				
pic		PICT	PICTURE	SPIC			
pid			PIDDLE				
PIG			PIGMENT	spig			SPIGGOT
pik	PIKE			spik	SPIKE		
PILL	PILE		PILLOW	SPILL		SPILT	
pim			PIMPLE				
PIN	PINE		PINCER	SPIN	SPINE		SPINDLE
pip	PIPE						
pis			PISTOL				
PIT			PITY	SPIT	SPITE		SPITTLE
PITH							
PITCH							
POCK			POCKET	SPOCK			
POD							
pok	POKE			spok	SPOKE		
pol	POLE		POLISH				
pom		POMP					
pon	PONE	POND	PONDER	-spon		-spond	
POP	POPE		POPPY				
pos			POSSUM				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
POSH							
POT			POTTER	SPOT			
PUB			PUBLIC				
PUCK			PUCKER				
PUFF							
PUG							
puk	PUKE						
pul		PULP	PULPIT				
pum		PUMP	PUMMEL				
PUN		PUNT	PUNISH	SPUN		SPUNK	
PUP			PUPPET				
PUS							
PUTT			PUTTY	sput			SPUTTER
rab			RABBIT	CRAB DRAB GRA			
RACK			RACKET	CRACK TRACK			CRACKLE
rac			RACCOON	trac		TRACT	TRACTOR
rad				BRAD grad trad	 GRADE TRADE		
raf		RAFT	RAFFLE	craf draf graf		CRAFT DRAFT GRAFT	

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
RAG				BRAG			
				CRAG			
				DRAG			
rak	RAKE			brak	BRAKE		
				drak	DRAKE		
ral			RALLY				
RAM		RAMP	RAMBLE	CRAM		CRAMP	
				DRAM			
				GRAM		GRAMP	
				tram		TRAMP	TRAMPLE
RAN		RAND	RANDOM	BRAN		BRAND	BRANDO
		RANT		cran	CRANE		CRANDELL
				FRAN			FRANTIC
RAP	RAPE	RAPT	RAPID	CRAP			
				TRAP			
ras		RASP	RASCAL	BRASS			
				CRASS			
				dras			DRASTIC
				GRASS			
RASH				BRASH			
				CRASH			
				TRASH			
				THRASH			
RAT	RATE		RATTLE	BRAT	-brate		
				crat	CRATE		
				grat	GRATE		
				PRAT	PRATE		PRATTLE
reck			RECKON	freck			FRECKLE
rec		-rect	RECORD				
RED				BRED			
				cred			CREDIT
				FRED			
				SHRED			

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
reg				DREG			
				GREG			
rek				TREK			
rel			RELISH	trel			TRELLIS
rem				grem			GREMLIN
				trem			TREMBLE
ren		REND	RENDER	bren		BRENT	
		RENT		fren			FRENZY
				tren		TREND	
rep			REPTILE	PREP			
res		REST	RESCUE	DRESS			
				PRESS			
				TRESS			
resh				FRESH			
				THRESH			
ret				FRET			
RETCH							
RIB			RIBBON	brib	BRIBE		
				CRIB			
				drib			DRIBBLE
				trib	TRIBE		TRIBUTE
RICK			RICKEY	BRICK			
				CRICK			CRICKET
				PRICK			
				TRICK			TRICKLE
RID	RIDE		RIDDLE	brid	BRIDE		
				GRID			
				prid	PRIDE		
rif	RIFE	RIFT		drif		DRIFT	
				shrif		SHRIFT	
				thrif		THRIFT	

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
RIG			RIGOR	BRIG			BRIGAND
				PRIG			
				trig			TRIGGER
rik				shrik	SHRIKE		
RILL	RILE			bril			BRILLIANT
				DRILL			
				FRILL			
				GRILL			
				SHRILL			
				THRILL			
				TRILL			
RIM	RIME			BRIM			
				crim	CRIME	CRIMP	CRIMSON
				GRIM	GRIME		
				prim	PRIME	PRIMP	PRIMROSE
				shrim		SHRIMP	
				TRIM			
rin				brin	BRINE		
				GRIN		GRIND	
				prin		PRINT	
				shrin	SHRINE		
RIP	RIPE		RIPPLE	DRIP			
				GRIP	GRIPE		
				TRIP	TRIPE		
rit	RITE		RITZY	brit			BRITTLE
				crit			CRITTER
				frit			FRITTER
				GRIT			
				trit	TRITE		
ritch				britch			
ROB	ROBE		ROBIN	prob	PROBE		PROBLEM
				THROB			
ROCK			ROCKET	BROCK			
				CROCK			
				FROCK			

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
ROD	RODE			PROD			
				TROD			
rog				FROG			
				GROG			
				prog			PROGRESS
rok				brok	BROKE		
rom	ROME	ROMP		PROM			
				trom		TROMP	
ron				cron	CRONE		
				dron	DRONE		
				pron	PRONE		PRONTO
				thron	THRONE		
rop	ROPE			CROP			
				DROP			
				grop	GROPE		
				PROP			
ROSS			ROSCOE	CROSS			
				fros		FROST	
				pros			PROSPECT
				-tross			
rosh				FROSH			
ROT	ROTE		ROTTEN	TROT			
ROTH				BROTH			
				FROTH			
				THROTH			
roich				CROTCH			
RUB	RUBE		RUBBER	DRUB			
				GRUB			
				SHRUB			
ruck			RUCKUS	TRUCK			

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
rud	RUDE		RUDDER	CRUD	CRUDE		
				prud	PRUDE		
RUFF	RUFE		RUFFLE	GRUFF			
RUG			RUGBY	DRUG			
				SHRUG			
rul	RULE			TRULL			
RUM		RUMP	RUMBLE	crum			
				DRUM			CRUMBLE
				frum		FRUMP	
				grum		GRUMP	GRUMBLE
				trum		TRUMP	
RUN		RUNT		brun		BRUNT	
				grun		GRUNT	
				prun	PRUNE		
				trun			TRUNDLE
rup		-rupt	RUPTURE	-brup		-brupt	
RUSS		RUST	RUSTY	brus		BRUSK	
				crus		CRUST	
				TRUSS		TRUST	
				thrus		THRUST	
RUSH				BRUSH			
				CRUSH			
				THRUSH			
rut				brut	BRUTE		
rutch				CRUTCH			
ris*		RISK		bris		BRISK	
				cris		CRISP	
				fris		FRISK	
				gris		GRIST	
rof*				PROF			
SACK							
SAD			SADDLE				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
saf	SAFE						
SAG							
sak	SAKE						
SAL	SALE		SALAD				
SAM	SAME		SAMPLE				
san	SANE	SAND	SANDAL				
SAP			SAPLING				
SASS			SASSY				
SASH							
SAT	SATE		SATIN				
sec		SECT	SECOND				
seg			SEGMENT				
SELL			SELDOM				
sem			SEMBLANCE				
sen		SEND SENT	SENTENCE				
sep			SEPTIC				
SET			SETTLE				
SICK			SICKLE				
SIC							
SID	SIDE						
sif		SIFT					
sig			SIGNAL				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
SILL		SILD SILK ILT	SILLY				
sim			SIMPLE				
SIN	SINE						
SIS			SISTER				
SIT	SITE						
SOB							
SOCK							
soc			SOCCER				
SOD							
sof		SOFT					
sog			SOGGY				
sol	SOLE		SOLID				
SOP							
SOT							
SUB			SUBJECT				
SUCK			SUCKLE				
sud			SUDDEN				
suf			SUFFER				
sug			SUGGEST				
sul		-sult SULK	SULTAN				
SUM		SUMP	SUMMER				

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
SUN			SUNDAY				
sup			SUPPER				
sus			SUSPENSE				
SUT							
shab			SHABBY				
SHACK			SHACKLE				
SHAD	SHADE		SHADOW				
shaf		SHAFT					
SHAG							
shak	SHAKE						
SHALL	SHALE	SHALT	SHALLOW				
SHAM	SHAME		SHAMBLE				
shan			SHANTY				
shap	SHAPE						
shat			SHATTER				
SHED							
SHELL		SHELF	SHELTER				
shep			SHEPHERD				
shet			SHETLAND				
SHIM			SHIMMY				
SHIN	SHINE		SHINNY				
SHIP							

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
shif*		SHIFT					
SHOCK							
SHOD			SHODDY				
shon	SHONE						
SHOP							
SHOT							
SHUCK							
shud			SHUDDER				
shuf			SHUFFLE				
SHUN		SHUNT					
SHUSH							
SHUT			SHUTTER				
TAB			TABLET	STAB			
TACK			TACKLE	STACK			
tac		TACT					
TAD			TADPOLE				
taf		TAFT	TAFFY	STAFF			
TAG				STAG			STAGGER
tak	TAKE			stak	STAKE		
tal	TALE	TALC	TALLY	stal	STALE		STALLION
tam	TAME	TAMP	TAMPER	stam		STAMP	STAMMER
TAN			TANTRUM	STAN		STAND	

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
TAP	TAPE						
tas		TASK	TASSEL				
tash				STASH			
tat	TATE		TATTER	stat	STATE		
TED							
TELL			TELLTALE	stel			STELLAR
tem			TEMPER	STEM			
TEN		TEND TENT	TENNIS	sten			STENCIL
				STEP			
TESS		TEST					
tet				STET			
TICK			TICKET	STICK			
TIC							
tid	TIDE						
TIFF				STIFF			
tik	TIKE						
TILL	TILE	TILT		STILL	STILE	STILT	
TIM	TIME		TIMBER				
TIN	TINE	TINT	TINSEL	stin		STINT	
TIP			TIPSY	stip			STIPPLE
titch				STITCH			
TOCK				STOCK			STOCKTON

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
TODD			TODDLE				
TOG			TOGGLE				
tok				stok	STOKE		
TOM	TOME			stom		STOMP	
TOP			TOPPLE	STOP			
TOSS							
tot	TOTE		TOTTER				
TUB	TUBE			STUB			STUBBORN
TUCK				STUCK			
tud				STUD			
tuf		TUFT		STUFF			
TUG							
tum			TUMBLE	stum		STUMP	STUMBLE
tun	TUNE		TUNNEL	STUN		STUNT	
TUT				stut			STUTTER
THAD							
THATCH							
thef		THEFT					
TH13	THEME						
TICK			THICKET				
thim			THIMBLE				
THIN	TH13						

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
TH13			THISTLE				
THUD							
THUG							
thun			THUNDER				
thum		THUMP					
THAN							
THAT							
THEM	TH11						
THEN							
TH11	THINE						
THIS			TH11				
THUS							
WAG				SWAG			SWAGGER
wak	WAKE						
WEB			WEBER				
WED				swed	SWEDE		
WELL		WELD WELT	WELFARE	SWELL			SWELTER
wen		WEND WENT		twen			TWENTY
wep		WEPT		swep		SWEPT	
WES		WEST	WESTERN				
WET							

CVC	CVCe	CVCC	CVC+SYL	CCVC	CCVCe	CCVCC	CCVC+SYL
WICK			WICKED				
wid	WIDE		WIDOW	twid			TWIDDLE
wif	WIFE	wift		swif		SWIFT	
WIG			WIGGLE	SWIG TWIG			
WILL	WILE	WILT	WILLOW	SWILL TWILL			
wim				SWIM			
WIN	WINE	WIND*	WINTER	swin TWIN	SWINE TWINE		SWINDLE
wip	WIPE			swip	SWIPE		
wis				SWISS twis		TWIST	
WISH			WISHFUL	SWISH			
WIT			WITNESS	TWIT			
WITH							
WITCH				SWITCH TWITCH			
wok	WOKE						
wum				SWUM			

Table B-4.

Domains of Initial CCC Clusters.

1st CCC	CCCVC	CCCVCe	CCCVC+SYL	CCCVCC	CCCVCC+SYL
SPL	SPLASH				
	splat		SPLATTER		
	splen		SPLENDOR		
	splin			SPLINT	SPLINTER
	SPLIT				
	SPLOTCH				
	splut		SPLUTTER		
SCR	SCRAG		SCRAGGLY		
	SCRAM		SCRAMBLE		
	SCRAP	SCRAPE			
	SCRATCH				
	scrib	SCRIBE	SCRIBBLE		
	scrim		SCRIMMAGE	SCRIMP	
	SCRIP		SCRIPTURE	SCRIPT	
	SCRUb				
	SCRUFF				
SPR	SPRAT				
	SPRIG				
	sprin			SPRINT	

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1st CCC	CCCVC	CCCVCe	CCCVC+SYL	CCCVCC	CCCVCC+SYL
	sprit	SPRITE			
	sprock		SPROCKET		
STR	strad		STRADDLE		
	straf	STRAFE			
	strag		STRAGGLE		
	stran			STRAND	
	STRAP				
	-strat	-strate			
	STREP				
	STRESS				
	STRETCH				
	strick		STRICKEN		
	stric		STRICTURE	STRICT	
	strid	STRIDE			
	strif	STRIFE			
	strik	STRIKE			
	strin		STRINGENT		
	STRIP	STRIPE	STRIPLING		
	strob	STROBE			
	strod	STRODE			
	strok	STROKE			

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1st CCC	CCCVC	CCCVCe	CCCVC+SYL	CCCVCC	CCCVCC+SYL
	STROM				
	STROP				
	STRUCK				
	struc		STRUCTURE	-struct	
	strug		STRUGGLE		
	STRUM		STRUMPET		
	STRUT				

We note in conclusion how two-syllable words of Tables B-3 and B-4 were selected. For each CVC, CCVC, and CCCVC item tabled, a two-syllable word having the tabled item as its first syllable was shown if one within the range of elementary education seemed available in Webster's Seventh New Collegiate Dictionary. The apparently most familiar-two syllable word was selected if there was a range of choices. While certain constraints were placed on the rule base underlying second syllables of the words selected, the rule base of second syllables is broader than that for first-syllables. The primary object of generating common two-syllable words was to identify single-syllable constructions that, while nonsensical when standing alone, were potentially useful in that they would be encountered whenever word attack instruction advanced to the level of polysyllabic words. Table B-5 presents counts of tabled-two-syllable words, classified by form of the first syllable and whether judged familiar or unfamiliar to children at the kindergarten level. Since only one exemplar was selected for each form of first syllable construction (and common syntactic suffixes, such as -ed, -ly, -ing, were not allowed as second syllables), the Table B-5 counts probably seriously underestimate the population of two-syllable words of interest.

Table B-5.

Familiar and Unfamiliar Two-Syllable Words of Tables B-3 and B-4

Item Classification	CVC+SYL	CCVC+SYL	CCCVC+SYL	Total
Unfamiliar Words	275	92	16	383
Familiar Words	92	9	2	103
Totals	367	101	18	486